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PRESSING PLANTS WITH DOUBLE-FACED CORRUGATED PAPER BOARDS.

George E. Nichols and Harold St. John.

The advantages to be gained by using corrugated paper boards in plant presses was first made widely known by Collins who, in 1910,[1] described his own experience with them, together with that of several other workers who independently had developed similar methods. Briefly outlined, the scheme originally employed by Collins was as follows. In building up a press, single-faced (s. f.) corrugated boards, i. e. boards in which one face is uncovered and ridged, the other covered and smooth, were substituted for the driers customarily employed, the specimens, enclosed only by thin specimen sheets of newspaper stock, being laid directly between these. After being strapped up the press was suspended over a lamp, and around it was tied a cloth skirt, draped so as to hang nearly to the floor, and "held open by means of a stiff wire hoop sewed in at the lower edge." The effect of the continuous current of warm air from the lamp, guided by the skirt and passing upward through the corrugated ventilators, was such that, to quote Collins (*l. c.*, p. 222), "plants which formerly took a week to dry can almost invariably be perfectly dried in less than 24 hours, and commonly in less than 12 hours." Furthermore, there was the added advantage that the bother of changing driers and spreading out the wet ones to dry was entirely eliminated.

Collins experimented with various modifications of the method

[1] Collins, J. F. The use of corrugated paper boards in drying plants. Rhodora **14**: 221–224. 1910.

just described and found that somewhat better specimens could be obtained, though not so quickly, by using ordinary driers in combination with the corrugated ventilators: a drier was placed over the ridged face of each board, so that the sheet containing the specimen lay between a drier on one side and the smooth face of a ventilator on the other. This scheme was essentially the one used in the field by Professors M. L. Fernald and K. M. Wiegand, "except that one change of driers was made in order to straighten folded leaves, etc." (*l. c.*, p. 223). It was found that such a press could be left without attention for several days, even in a humid climate. Finally, Collins suggested the practicability of using various sources of heat other than the lamp, such as an oil stove, electric heater, cook stove, steam radiator, etc.

Three years later Ricker,[1] in a government circular designed primarily to instruct novices in the preparation of presentable botanical specimens, recommended the use of corrugated boards in combination with driers for pressing, advising that the specimen sheet be separated from the ventilators on both sides by driers. He recommends double-faced (d. f.) boards, i. e. boards with both faces covered and smooth, in preference to the single-faced type, and stipulates that the corrugations should run lengthwise the board. Regarding the use of the d. f. board Collins (*l. c.*, p. 223) was of the opinion that although "it is better to handle, and can be used either side up, it appears doubtful at present if it has any particular advantages otherwise over the single-faced."

The primary object of the present paper is to proclaim the advantages of the d. f. board ventilators, and to describe briefly our experience in using them under diverse conditions, with the hope that others may profit by our results. During the summer of 1915 and again in 1916 the senior writer spent about two months in ecological investigations in northern Cape Breton.[2] As a desirable adjunct to these studies considerable attention was devoted to the flora of the region, and something over 2000 sheets of vascular plants were prepared. For pressing and drying, d. f. corrugated boards, cut with the corrugations running lengthwise, were used, driers being omitted except with occasional

[1] Ricker, P. Z. Directions for collecting plants. U. S. Dept. Agr. Bur. Pl. Ind. Cir. 126. pp. 27–35. *f. 1–5.* 1913.

[2] See Nichols, G. E. The vegetation of northern Cape Breton Island, Nova Scotia. Connecticut Acad. of Arts & Sciences **22**: 249–467. f. 1–70. 1918.

bulky specimens. Altogether only about 75 boards were taken into the field. The general scheme followed was that described by Collins and needs little further comment. As a source of heat an ordinary kerosene lantern was used. Incidentally, in this connection, it was found that, in addition to an abundant supply of oil, a stock of extra wicks was essential, since, with the lantern running continuously day and night, the wick had to be well trimmed at least once and preferably twice a day. About a month of each summer was spent in permanent camp, and during this period the press was hung in a special shelter: the first summer in a makeshift tent, roofed with tarpaulin and walled with boughs; the second summer in a small hut constructed out of tar-paper and scantlings. The latter part of each summer was spent partly in localities where "hotel" accommodations were available, partly in trips of about a week's duration through an uninhabited wilderness where all luggage had to be packed and carried. On these latter jaunts little attempt was made to dry specimens properly, but at the hotels it was customary to run the press as usual, suspending it by means of home-made wire hooks between the backs of two chairs.

The experience gained during these two summers demonstrated conclusively the worth of d. f. ~~driers~~. As a rule plants were left in the press for 24 hours, the press being reversed at the end of 12 hours to insure even drying toward both ends of the press. This length of time sufficed to completely dry ordinary specimens, and even *Mertensia*, a notoriously difficult subject, was out of the press within three days. It should be interpolated, however, in the light of more recent experience, that boards cut with the corrugations running crosswise give more satisfactory results than those with corrugations running lengthwise. With the latter there is a tendency for parts lying near the center of the press to dry slowly, a tendency which is quite obviated where the corrugations run crosswise. The specimens prepared by the method just described are all that could be desired, and are noticeably superior to those prepared with the help of s. f. ~~driers~~ alone. Even *Mertensia* makes a fairly presentable specimen, retaining its color at least much better than any other specimens we have seen. As might have been expected, by the end of the first summer all of the ventilators showed unmistakable signs of service, and many of those that had had the misfortune to lie next to bulky specimens were pretty much out of commission. But that they stood up well under the test is demonstrated by the fact that many of them were again used throughout the second season.

In July, 1917 we contemplated a long, hard canoe trip in northwestern Maine, with the collection of plants as our primary object. From the start nearly to the finish of our 250 mile journey we realized that it would be necessary to depend on what could be carried in two canoes, together with what could be obtained from the woods. It was obvious that botanical equipment must be reduced to a minimum and yet at the same time be absolutely dependable. In view of the satisfactory results obtained by the senior writer with d. f. ventilators, this part of the equipment was quickly settled upon. A second matter demanding attention was the source of heat. With the prospect of long, hard days of poling and dragging the canoes upstream and of at least one long portage we hesitated about loading down with a three weeks supply of oil. So, at the suggestion of the junior writer, it was decided to place our dependence on a campfire — with what success will be seen. In addition, then, to sundry press frames, straps, and specimen papers, our equipment for preparing specimens, as finally boiled down, consisted of two hundred d. f. corrugated boards, cut with the corrugations running crosswise, fifty Washington driers (the purpose of which will be pointed out presently), and an abundant supply of matches. Thus armed, we sallied forth into the wilderness.

In the preparation of specimens our general method of procedure was somewhat as follows. The freshly collected plants were placed in pressing papers and press number one was built up of these plus occasional interlarded driers. It will be seen that driers were not eliminated completely, but for the most part they were used only in connection with this first press, and here primarily to place on either side of the heaviest plants, thus protecting their neighbors from undue crushing. To a certain extent they were also used between groups of specimen sheets and to even up the press. For these purposes it was not necessary that they should be thoroughly dried out after each application. Press number one was then strapped up tightly and set aside for from twelve to twenty-four hours. Ordinarily it traveled a day in the canoe, wrapped securely in a waterproof bag. At the end of this time it would be unstrapped and the entire bale of plants carefully worked over, leaves which were crumpled or out of place being straightened or shifted, flowers or fruits being brought into due prominence, etc. From the specimens thus treated would be built up press number two, this time with a ventilator alternating

with every specimen sheet. After this fashion a stack might be built up to a height of sometimes two feet or more.

In strapping up this final press, the straps were placed crosswise the press, a foot or more apart, with both buckles on the same side of the press — one of the open sides. For straps, broad, webbing trunk straps were used: these can be adjusted much more easily than leather straps and are much stronger. These straps were twelve feet in length and by tying together the free ends, a loop of any length desired could be made, by which the press could be hung up to dry.

The press was now ready for the fire. At first thought it seemed like tempting Providence to entrust our plants to an open fire, but experience showed that with due care there was little danger. Only twice during our trip, the first and the last day in camp, did any catastrophe threaten: the first time due to lack of experience, the last due to an overzealous attempt to exceed the speed limit in the drying process. On both occasions the press was rescued before any serious damage had been done.

The matter of fuel was the occasion of considerable experimentation. Coniferous wood burns too rapidly and flares up too much. Of the woods available in the region traversed, alder makes the hottest fire, but the sticks are small and a green alder fire of the sort required demands constant nursing. We finally settled on green paper birch. This was everywhere available, was easy to cut and split, and once started produced a hot fire, but without too many sparks or too much flame and smoke, a fire which could be depended on for a maximum continuous supply of heat with a minimum amount of attention, especially after it had been tamed down to a glowing bed of coals.

For holding the press in position over the fire a tripod was constructed from light saplings about ten feet long, bound together at the smaller ends with a piece of cord. The tripod was straddled over the fire and the press suspended from the projecting end of one of the saplings (one of which it was our custom to cut short for this purpose), broadside over the fire and at such an angle that the channels in the ventilators would lie in a vertical position. The height of the press above the fire was determined approximately beforehand by lengthening or shortening the loop, but both height and position could be subsequently regulated by shifting the legs of the tripod. With a slow fire the press could be left at a height of barely two feet above the coals without danger, but the "coefficient of safety" naturally varies and can be judged only by experience.

The results obtained by the method just described were fully as satisfactory as those secured when a lantern was used as a source of heat, and indeed material could be dried even more rapidly. Under favorable conditions completely dried specimens could be turned out in from three to five hours: specimens in which the natural color was retained far more perfectly than in plants prepared by the ordinary slower methods of drying, and which showed no ill effects from their hot air treatment save a slight smoky smell which soon vanished. Only in exceptional cases was the imprint of the corrugations to be detected in the finished product. Wind and rain were two of the chief enemies with which we had to contend. To avoid the former we always looked for a sheltered pocket among the evergreens where the tripod could be set up. Sometimes we rigged up a make-shift wind-break with a pack-cloth, while in wet weather a pack-cloth draped tepee-fashion around the top of the tripod served the double end of keeping the press dry and the fire alive. These, however, are two enemies against which on another trip more preparation would be made beforehand.

As with the lantern method, the d. f. ventilators stood up remarkably well. They showed some effects of their hard usage, to be sure, and after being in service for a week, with the smoke constantly rising through their pores, they began to smell like a lot of kippered herring, but what real camper would object to that! And notwithstanding that all the ventilators were in practically continuous service for twenty-four days, not one was actually rendered useless.

In conclusion, a few observations of a general nature regarding the relative merits of the current methods of drying vascular plants for herbarium specimens. The following remarks pertain more especially to field operations, but in large measure they are quite as applicable to herbarium or home practise. In the matter of driers or their "equivalents", four possibilities are open: driers, s. f. ventilators, s. f. ventilators plus driers, and d. f. ventilators. Furthermore there is the choice between various sources of artificial heat or no artificial heat at all. In deciding upon the relative efficiency of various methods, there are perhaps five principal factors to be taken into account: (1) length of time required to dry specimens and (2) quality of results; and (3) weight, (4) durability, and (5) convenience in handling of the drying equipment. Sufficient objections to driers alone are furnished by the first and third factors; to s. f. ventilators

alone by the second and fourth. As to the relative merits of s. f. ventilators plus driers versus d. f. ventilators, it should be said that the results obtained with the former of these two equipments are quite equal to those obtained by the latter, but the first, third, fourth and fifth factors mentioned above are all in favor of the d. f. ventilators. Using the first equipment it takes several days to dry a load of plants, while with the second a full capacity load can be turned out each day. In this connection it should be remarked that the "Washington" drier is far superior to the ordinary type in its greater absorbent power, thinness, firmness, and strength. So far as bulk and actual weight are concerned, equal quantities of s. f. ventilators plus driers, on the one hand, and of d. f. ventilators, on the other, are about equally matched: one hundred d. f. ventilators were found to weigh $28\frac{1}{4}$ pounds, as compared with $15\frac{5}{8}$ and $13\frac{1}{4}$ pounds for the same quantities of s. f. ventilators and Washington driers respectively. But the great saving in both bulk and weight is seen when account is taken of the speed with which results can be obtained by using the d. f. ventilators. On an extended collecting trip a given number of d. f. ventilators will turn out as many dried specimens as three or four times their number of s. f. ventilators plus driers. Add to this the greater convenience in handling and the superiority of the d. f. ventilators can hardly be questioned.

With regard to the use of artificial heat, it is our opinion, based on several years' experience, that so far as the quality of results is concerned no potent objection can be urged against it: on the contrary, as earlier indicated, the specimens dried in this way are obviously superior to those dried without heat. Moreover the saving of time and energy and, in the field, of weight and bulk are big items. As to the source of heat, for field work either a lantern or a fire is satisfactory. It must be admitted, however, that a fire does require more or less constant attention, and that on this account, where it is practicable, a lantern is to be preferred, since, while it does not produce results quite as rapidly, the lantern requires much less supervision and can be left on duty day and night.

For use in the laboratory the senior writer has found great satisfaction in the following equipment. A rectangular wooden box about three feet high and open at the top was constructed. The width of the box is slightly more than the length of a pressing frame; its length is immaterial, but is sufficient to accommodate a press about two feet

thick. An inch or so below the rim of the box, lengthwise on either side, was fixed a wooden ledge. The press, instead of being suspended from above, is supported on this ledge and is girded with a canvas skirt which hangs down well below the upper edge of the box. As a source of heat a small electric stove is used, the connecting cord of which passes out through one of several holes which have been bored in the sides of the box near the base.

THE SPECIFIC VALIDITY OF LIMOSELLA SUBULATA.

M. L. FERNALD.

ONE of the most characteristic plants of tidal flats, brackish shores and borders of salt marshes in eastern North America is the little matted and creeping plant which is known in our floras as *Limosella aquatica*, var. *tenuifolia*, or sometimes as a distinct species, *L. tenuifolia*. Our plant, treated either as a variety of *L. aquatica* L. or as a species, *L. tenuifolia* Wolf, is thus inferred to be identical with the European *L. tenuifolia*. But so far as the writer is able to determine, Wolf's species, *L. tenuifolia*,[1] is merely a dwarfed form of the European *L. aquatica*, with the leaf-blade very short and linear instead of narrowly elliptic. This is the estimate of the European *L. tenuifolia* by essentially all European authors, including Hoffmann who originally published it not as a true species but as subordinate to *L. aquatica*; and it has been so regarded in Europe for nearly a century, Schübler & Martens as early as 1834 calling it *L. aquatica* β. *L. tenuifolia*,[2] a nomenclatorial combination which has been repeatedly published as new by different subsequent authors even down to the year 1909.

Limosella aquatica L. is a characteristic European plant found also in southern Labrador and generally over the western portions of temperate North America, having leaves with definite blades varying from oblong to elliptic in the commoner form of the plant or narrowly oblanceolate to barely linear in the more reduced forms (var. *tenuifolia*).

[1] Wolf. ex Hoffm. Deutsch. Fl. ed. 2, i. part 2, 29 (1804).
[2] Schübler & Martens, Fl. von Würtemb. 396 (1834).

This plant, *L. aquatica*, with definite leaf-blades has a pronounced rosette-habit, forming ordinarily circular rosettes with the branches decumbent and producing tufts of leaves and numerous flowers at the tips and sometimes again proliferating. In wet habitats the species roots freely at these points of proliferation, but the specimens from Europe, as well as from western America, all show that the individual plants are fairly circumscribed and do not creep extensively. European plates such as those of Reichenbach,[1] Flora Danica (table 69) or Sowerby [2] excellently display the habit and foliage of *L. aquatica*. The plant in Europe, as well as in North America, occurs in fresh soils, chiefly in sandy margins of lakes and ponds, or, as expressed by Syme, "places where water has lain in winter." The plant of the Atlantic seaboard of North America, on the other hand, has absolutely no leaf-blade, the leaves being filiform or nearly terete; and the plant has a very closely repent, matted habit, forming dense turf, with the closely creeping stolons setting under favorable circumstances lines of new tufts, often extending in rows some decimeters away from the parent rosette. The plant is so closely repent that it is impossible in the material from the Atlantic seaboard to find any specimens in which the tufts of foliage are not conspicuously rooting at base and the plant is usually so matted as to form a turf almost impossible of disentanglement. This closely matted or creeping plant of Atlantic America is found strictly in saline or subsaline soils, always on the coast, the only specimens from inland stations coming from points not further than one or two miles from the sea.

It would therefore seem very improbable that the plant of eastern America, from Newfoundland and the lower St. Lawrence to New Jersey and eastern Pennsylvania, is conspecific with the plant of quite different habit, which is so widely spread in fresh habitats over Europe and western America. Many attempts have been made in the past to separate our coastal plant, but, so far as the writer can find, these have all proved unconvincing, and the Atlantic coast plant has been left in all recent treatments either as *L. aquatica* or as the European dwarfed var. *tenuifolia*. The first attempts to distinguish the American from the European plant were made early in the last century when the species was discovered in southern New England and on the lower Delaware. In 1816 Messrs. H. N. Fenn and M. C.

[1] Reichenbach, Ic. Fl. Germ. xx. tab. 1722 (1862).
[2] Sowerby, Engl. Bot. ed. Syme, vi. tab. 968 (1873).

Leavenworth discovered the plant at New Haven, "on the margin of the river, where it was covered by every tide";[1] and later in the year Dr. Eli Ives of New Haven collected it in brackish soils "in great abundance in the Housatonic and in most of the rivers which empty into Long-Island Sound, within the range of the tide," and he also stated in his publication that "it has been found this year [1817] by Messrs. Nuttall and Collins, on the banks of the Delaware near Philadelphia."[2] Dr. Ives felt that he had a new species, which he published with a very full description, as *L. subulata*.[2] Simultaneously Nuttall was writing up the same plant and his description of it appeared while Dr. Ives's description of *L. subulata* was in press, Nuttall identifying the plant as the European *L. tenuifolia*, but giving a very detailed account of his material, which came from "miry and gravelly banks of the Delaware, subject to the overflowings of the tide, in New-jersey and Pennsylvania, near Kensington, in the suburbs of Philadelphia" "also in Connecticut; — Dr. Ives, in a letter to Z. Collins, Esq."[3] Nuttall's description was quite as detailed as that of Ives, but as noted, Nuttall treated his plant as *L. tenuifolia* Wolf.

Somewhat later, in 1833, Rafinesque described the plant of New Jersey as a new genus, *Ygramela*, with the species *Y. maritima*[4] but with the pharisaical desire to be on both sides of the fence, like some modern authors, he added the comment: "If some Botanists will unite it to *Limosella*. . . . they may call it *L. maritima*." In his discussion Rafinesque laid much stress upon the habit of the plant, saying "it has the habit of *Limosella*, but forms a compact short turf."

All subsequent authors, so far as the writer can determine, have maintained our plant as identical with the European *L. tenuifolia*, sometimes as a variety, sometimes as a species, but with no statement of additional characters. A close inspection shows, however, that there are certain tendencies which are fairly constant and which indicate that our plant is probably best treated as a distinct species of eastern America. The leaves and habit have already been discussed. European authors are essentially unanimous in their statement that the corolla of *L. aquatica* is pink or flesh-color, only occasionally white; but the plant of the maritime sands and marshes of eastern America

[1] Ives, Am. Jour. Sci. i. 74 (1819).
[2] Ives, Trans. Physico-Medical Soc. N. Y. i. 441 (1817).
[3] Nutt. Journ. Acad. Nat. Sci. Phil. i. 115, 116 (1817).
[4] Raf. Atl. Journ. i. 199 (1833).

has the corolla white or at most with a bluish tinge on the outside. The calyx of the European plant is uniformly described and illustrated as regular; but in the plant of eastern America the calyx, although sometimes nearly regular, usually has the lobes somewhat united in twos, a character pointed out by Dr. Ives in his original description of *L. subulata*, when he laid much emphasis upon this point. The material of *L. aquatica* from western America agrees with the European in its very regular calyx and the descriptions of the plant of western America state that the corollas are usually pink. In *L. subulata* the scapes are very quickly recurved, so that the fruiting plants form a close tangle of arching and interlocking scapes. In the European species this arching is much less conspicuous, as it is in the material of *L. aquatica* in western America, where many of the scapes stay quite straight and erect until maturity, although some arching is found in *L. aquatica*. The style of *L. subulata* is more slender and delicate and usually more curved than in *L. aquatica*, in which the style is straight and comparatively short, although the difference is a minute one and better seen by comparison than indicated by measurement. In the capsule of *L. aquatica* the margins of the valves are thickened so that the dehisced valves appear to have a "wire-edge," but in *L. subulata* the edges of the valves are without this thickening, being thin and often more or less involute in the old capsules. Attempts have been made to find stable characters in the seeds but thus far these have failed, although there are occasional specimens which show recognizable differences; but in view of the very different habit of *L. subulata* and its uniformly saline or brackish habitat, its strictly bladeless leaves, its white corollas, its usually irregular calyx and the thin-edged valves of its capsules, it would seem that *L. subulata* should be recognized as a valid species of the brackish and saline shores from Newfoundland and the lower St. Lawrence to the lower Delaware River.

The only material of *L. aquatica* yet known from eastern America is from the southeastern corner of the Labrador peninsula, where it was collected in 1882 by the late John A. Allen and more recently (in 1915) by Dr. St. John on sandy pond shores, just within the Straits of Belle Isle. The material is immature in both instances but presents no characters which seem to separate it from the common *L. aquatica* of Europe and of western America, but it is noteworthy that this plant of fresh sands and pond-shores is not found generally

about the Gulf of St. Lawrence or in Newfoundland, where *L. subulata* abounds in brackish habitats or in the salt marshes. Certain specimens from the Andes of Bolivia strongly simulate *L. subulata*, but they are very immature and until further material is available, it is impossible to say anything of their exact identity. It would be highly improbable, however, though not without precedent, that *L. subulata*, which in North America seems so definitely confined to the temperate Atlantic shores, should also occur in the Andes.

The nomenclatorial history of *Limosella subulata* may be summarized as follows:

Limosella subulata Ives, Trans. Phys.-Med. Soc. N. Y. i. 441 (1817), Am. Journ. Sci. i. 74 (1819). *L. tenuifolia* Nutt. Journ. Acad. Nat. Sci. Phil. i. 115 (1817), not Wolf. *Ygramela maritima* Raf. Atl. Journ. i. 199 (1833). *L. maritima* Raf. l. c. (1833). *L. aquatica*, var. *tenuifolia* Torr. Fl. N. Y. ii. 40 (1843), not Schübler & Martens, Fl. von Würtemb. 396 (1834).

Gray Herbarium.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,— XXVIII.

This list includes a large number of waifs, mostly wool-waste plants from the West and from southern Europe. Few if any of them have really persisted and spread, but it has seemed well to include them, as they are all represented by identifiable specimens, and as many of them have already been published in Dame & Collins's Middlesex Flora. The specimens have been carefully compared with authentic material in the Gray Herbarium.

Our knowledge of these interesting plants is due chiefly to those earnest collectors, Dr. Charles W. Swan, Charles E. Perkins, Rev. W. P. Alcott, Miss Emily F. Fletcher and Mrs. C. N. S. Horner. Mr. Alcott's collections are poorly represented in the Club Herbarium, so, if any reader knows where the main Alcott herbarium is kept, he will do a service by notifying the committee.

LEGUMINOSAE.

AMORPHA.

A. FRUTICOSA L. Escaped from cultivation at Lynn, Arlington, Boston, Halifax, Sharon, probably elsewhere.

AMPHICARPA.

A. monoica (L.) Ell. Open woods throughout.

A. Pitcheri T. & G. Damp woods, Oak Island, Revere (*W. P. Rich*, Aug. 25, 1893; *C. H. Knowlton*, Aug. 10, 1906); thicket, border of Mystic Lake, Winchester (*W. P. Rich*, Aug. 21, 1887); rich woods, slopes of Horn Pond Hill, Woburn (*M. L. Fernald & Bayard Long*, Oct. 5, 1913).

APIOS.

A. tuberosa Moench. Moist thickets, common throughout.

[*Arachis hypogaea* L. (peanut) comes up occasionally in waste places. Reported from Cambridge and South Boston.]

ASTRAGALUS.

A. CONTORTUPLICATUS L. Wool-waste, J. V. Fletcher farm, Westford (*Miss E. F. Fletcher*, June —, 1911). Native of southern and western Europe and the East. See RHODORA xiv. 56, 1912.

A. GLYCYPHYLLOS L. Vacant lot, escaped from Fenway, Boston (*W. P. Rich*, Aug. 2, 1906 et seq.) Native of Europe and the East.

BAPTISIA.

B. tinctoria (L.) R. Br. Dry sandy and rocky soil, common throughout.

CASSIA.

C. Chamaecrista L. Dry sand, occasional from Everett, Medford, Arlington and Littleton southward; not reported from Essex country.

C. marilandica L. Moist soil at fifteen scattered stations; at some places probably introduced.

C. nictitans L. Sandy soil, well distributed throughout.

CICER.

C. ARIETINUM L. Dump, Dorchester (*J. R. Churchill,* July 10, 1904). Specimens in herb. J. R. Churchill and N. E. Botanical Club. Native of southern Europe.

CLADRASTIS.

C. LUTEA (Michx. f.) Koch. Scattered trees growing spontaneously, Brookline (*F. F. Forbes,* June 9 and Sept. 25, 1902).

COLUTEA.

C. ARBORESCENS L. Introduced at S. P. Fowler place, Danvers (*Mrs. C. N. S. Horner,* no date); railway embankment, Wakefield (*R. C. Bean,* Sept. 23, 1916); roadside, Cambridge (*A. S. Pease,* Aug. 8, 1908).

CORONILLA.

C. SCORPIOIDES (L.) Koch. Charlestown (*C. E. Perkins,* July 23, 1881). Specimen in herb. N. E. Botanical Club. Native of Mediterranean region and Persia.

C. VARIA L. Escaped at Concord, Boston (Back Bay) and Hyde Park. [Dr. C. W. Swan's plant from Westford, reported in Dame & Collins, Fl. Middlesex Co. 29, 1888 is too poor a specimen to be verified.]

CROTALARIA.

C. sagittalis L. Sandy soil, at twelve scattered stations. Collected from Winchester in 1853, from Cambridge in 1824 and from Needham in 1834.

CYTISUS.

C. SCOPARIUS Link. Brookline (*E. & C. E. Faxon,* Aug. 28, 1887).

DESMODIUM.

D. bracteosum (Michx.) DC. Dry open woods, rare; Wenham, Lowell, Woburn, Melrose, Malden, W. Roxbury, Canton, Natick, Needham.

D. canadense (L.) DC. Dry soil, common.

D. canescens (L.) DC. Dry open woods, rare; Ipswich, Natick, Winchester, W. Cambridge, Revere, Waltham; roadside, Arlington, August, 1853 and 1869 (*Wm. Boott*), according to Dame & Collins, Fl. Middlesex Co. 27, 1888.

D. Dillenii Darl. Dry open woods; numerous stations in Middlesex and Norfolk counties. Not reported from Suffolk and Plymouth counties, and only collected from Georgetown and Wenham in Essex County.

D. grandiflorum (Walt.) DC. Rich woods, frequent.

[*D. glabellum* (Michx.) DC. Reported from "Mass." in Gray's Manual, 7th ed. Investigation at the Gray Herbarium shows that this report is based on a specimen collected by J. W. B. (John Wright Boott) in 1832. The label is in Francis Boott's writing. The sheet went to the Herb. Benthamianum in 1854, thence to the Gray Herbarium. On the herbarium sheet some unknown hand, evidently English, has written in pencil "Boston, U. S. A." There is therefore no reliable information as to where this plant of John Wright Boott's was collected.]

D. marilandicum (L.) DC. Dry open woods, occasional. Apparently rare in Essex county.

D. nudiflorum (L.) DC. Dry open woods, common.

D. obtusum (Muhl.) DC. Rocky woods, rare; Dracut, Bedford, Concord, Brookline, W. Roxbury, Needham.

D. paniculatum (L.) DC. Dry open woods, occasional; only collected from Danvers in Essex county, and from none of the towns south of Randolph and Sherborn.

D. rigidum (L.) DC. Dry woods, frequent in Middlesex county. Only collected from Andover and Georgetown in Essex county, and no reports south of Blue Hill and Hingham in Norfolk and Plymouth counties.

D. rotundifolium (Michx.) DC. Dry woods, apparently well distributed.

GENISTA.

G. TINCTORIA L. Introduced at Salem in the earliest days of the colony, and very abundant in pastures there, a wonderful sight about July 4; spreading throughout Essex county and sporadic at several other places.

GLEDITSIA.

G. TRIACANTHOS L. Occasional; the two stations at Sherborn and Malden may be self-planted; other trees probably merely persistent.

GLYCYRRHIZA.

G. LEPIDOTA (Nutt.) Pursh. Dump, Lawrence (*A. S. Pease*, June 10, 1903 and June 23, 1904); wool-waste, N. Chelmsford (*Miss E. F. Fletcher*, Sept. 5, 1917).

HOSACKIA.

H. AMERICANA (Nutt.) Piper. Back yard, Needham (*T. O. Fuller*, Aug. 20, 1898). Specimen in herb. N. E. Botanical Club. Fugitive from west of the Mississippi.

LATHYRUS.

L. APHACA L. Boston (*C. E. Perkins*, July 6, 1878). Native of Europe and the East.

L. maritimus L. Sea-beaches along the coast.

L. maritimus L., var. **glaber** (Seringe) Eames, RHODORA xi. 95, 1909. Sea-beaches at Plum Island, Gloucester, Manchester and Revere.

L. palustris L., var. **pilosus** (Cham.) Ledeb. (RHODORA xiii. 47–52, 1911). Meadows and brackish marshes, all along the coast.

L. PRATENSIS L. Cultivated field, Concord 1891, A. W. Hosmer in RHODORA i. 223, 1899. This has also been secured at Concord this year by Wm. Brewster on a dry grassy hilltop in Miss Mary Eaton's estate adjoining Sleepy Hollow Cemetery. Mr. Brewster collected it on June 27, and reports that it is definitely established

there, forming mats over an area larger than a good-sized room. It is not now grown in gardens there. Specimens in Herb. Gray and N. E. Botanical Club.

L. SATIVUS L. Dump, Lowell (*C. W. Swan*, Aug. 4, 1884). Specimen in herb. N. E. Botanical Club. Fugitive from Europe.

LESPEDEZA.

L. Brittonii Bicknell. Blue Hill Reservation, Milton (*G. G. Kennedy*, Aug. 29, 1909); Muddy Pond Hills, Boston (*Edwin Faxon*, Sept. 10, 1892. This specimen in the herbarium of Columbia University, New York, was cited in the original description. See E. P. Bicknell, Torreya i. 104, 1901).

L. capitata Michx. Dry sandy soil. Common throughout.

L. capitata Michx., var. **stenophylla** Bissell & Fernald (RHODORA xiv. 92, 1912). Blue Hill Reservation, Milton (*G. G. Kennedy*, Sept. 22, 1895).

L. capitata Michx., var. **velutina** (Bicknell) Fernald. Occasional.

L. frutescens (L.) Britton. Dry open woods, common throughout.

L. hirta (L.) Hornem. Dry sandy soil, common throughout.

L. Nuttallii Darl. Dry open woods. Not reported from Essex Co., but frequent elsewhere.

L. procumbens Michx. Dry sandy soil, frequent near Boston and west to Sherborn and Framingham; apparently rare elsewhere.

L. Stuvei Nutt. Woods, Dover (*K. M. Wiegand*, July —, 1908). The specimen is in the herbarium of Wellesley College.

L. violacea (L.) Pers. Dry open woods; frequent around Boston, also collected at Andover and Danvers.

L. virginica (L.) Britton. Dry rocky woods and hillsides, common.

LOTUS

L. CORNICULATUS L. Boston (*C. E. Perkins*, ——, 1882). Specimen in herb. N. E. Botanical Club.

LUPINUS.

L. perennis L. Dry sandy soil; frequent, especially in Middlesex county.

MEDICAGO.

M. AGRESTIS Ten. (*M. aculeata* Willd. of Dame & Collins, Fl. Middlesex Co. 26, 1888). Woollen mills at Graniteville, Westford (*C. W. Swan*, Aug. 20, 1885). Specimen in herb. N. E. Botanical Club. Native of southern Europe and Syria.

M. ARABICA (L.) Huds. Woollen mill refuse and waste places, rare; Georgetown, Newbury, Lawrence, Dracut, Lowell, Chelmsford, Somerville, Roxbury.

M. FALCATA L. Wool refuse and waste places, rare; Middleton, Lowell, Westford, Boston.

M. HISPIDA Gaertn. Woolen mill yards and dumps, rare.

M. HISPIDA Gaertn., var. APICULATA Urban. (*M. lappacea* Lam. of Dame & Collins, Fl. Middlesex Co. 25, 1888). Parker River mills, Georgetown (*Mrs. C. N. S. Horner*, no date); Charlestown (*C. E. Perkins*, July 22, 1879); Boston (*C. E. Perkins*, —, 1882).

[M. INTERTEXTA Willd. from wool-waste Westford (*C. W. Swan*) reported in Dame & Collins, Fl. Middlesex Co. 26, 1888, is represented in herb. N. E. Botanical Club and Yale, but specimens are too young for satisfactory determination.]

M. LACINIATA All. Dracut or Lowell (*C. W. Swan*, Aug. 6, 1884); S. Boston flats (*C. E. Perkins*, —, 1878 and Sept. 29, 1881). Native of Mediterranean region.

M. LUPULINA L. Fields and waste places, common.

M. MINIMA L. Woollen mills at Graniteville, Westford (*C. W. Swan*, Sept. 15, 1884); dump, Lowell (*C. W. Swan*, Aug. 6, 1884); sown by wool, N. Chelmsford (*W. P. Alcott*, —, 1878). One specimen of the last seems to be var. *longiseta* DC. Native of Europe.

M. PRAECOX DC. Wool-waste at Graniteville, Westford (*C. W. Swan*, Aug. 20, 1885). Specimens in herb. N. E. Botanical Club and Yale.

M. SATIVA L. Fields and waste places, frequent.

MELILOTUS.

M. ALBA Desr. Waste places, common.

M. INDICA (L.) All. (*M. parviflora* Desf.) Waste places, rare; Dracut or Lowell, Westford, Cambridge, Charlestown, Boston. Native of the Mediterranean region and southern Asia.

M. OFFICINALIS (L.) Lam. Waste places, frequent.

ONOBRYCHIS.

O. VICIAEFOLIA Scop. Open field, Wellesley (*K. M. Wiegand*, June —, 1910). Specimen in herb. Wellesley College. The sainfoin or holy clover, cultivated for fodder in the southern States. Introduced from Europe and Asia.

PAROSELA.

P. DALEA (L.) Britt. (*Dalea alopecuroides* Willd. of Gray's Manual, 7th ed.) S. Boston flats (*C. E. Perkins*, Sept. 29, 1881). A waif from the West.

PISUM.

P. SATIVUM L. Waste places, occasional; seldom if ever re-seeding itself.

ROBINIA.

R. HISPIDA L. Persistent and spreading from old gardens.

R. PSEUDO-ACACIA L. Naturalized and spreading in many places.

R. VISCOSA Vent. Persistent and spreading, especially around old places.

SCORPIURUS.

S. SUBVILLOSA L. Westford near Graniteville woollen mills (*C. W. Swan*, Sept. 15, 1884.) Specimen in herb. N. E. Botanical Club. Adventive from Europe.

STROPHOSTYLES.

S. helvola (L.) Britton. Sandy shores all along the coast from Amesbury to Plymouth, but not very abundant.

C. H. KNOWLTON, WALTER DEANE } *Committee on Local Flora.*

SOLIDAGO RACEMOSA Greene, forma **leucantha**, n. f., ligulis albescentibus, floribus disci ochroleucis.

Rays whitish; disk-flowers creamy.— NEW HAMPSHIRE: with the typical orange-flowered form, argillaceous ledges by the Connecticut River, Bath, August 18, 1917, *Fernald*, no. 15,575 (TYPE in Gray Herb.). — M. L. FERNALD, Gray Herbarium.

Vol. 20, no. 236, including pages 133 to 152 and plate 124, was issued 1 August, 1918.

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